

Preliminary Classification: 12-13-99

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example "Proposed Class 2, subclass 129." M.P.E.P. § 601, 7th ed.

jc525 U.S. PTO  
09/458906  
12/10/99

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Box Patent Application  
Assistant Commissioner for Patents  
Washington, D.C. 20231

## NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Harri LILJA, Jari VALLSTROM

**WARNING:** 37 C.F.R. § 1.41(a)(1) points out:

"(a) A patent is applied for in the name or names of the actual inventor or inventors.

"(1) The inventorship of a nonprovisional application is that inventorship set forth in the oath or declaration as prescribed by § 1.63, except as provided for in § 1.53(d)(4) and § 1.63(d). If an oath or declaration as prescribed by § 1.63 is not filed during the pendency of a nonprovisional application, the inventorship is that inventorship set forth in the application papers filed pursuant to § 1.53(b), unless a petition under this paragraph accompanied by the fee set forth in § 1.17(i) is filed supplying or changing the name or names of the inventor or inventors."

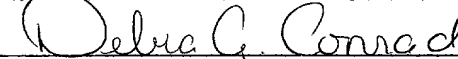
For (title): A METHOD TO DETERMINE CHANNEL INFORMATION IN A CELLULAR SYSTEM, AND A  
MOBILE STATION

**CERTIFICATION UNDER 37 C.F.R. § 1.10\****(Express Mail label number is mandatory.)**(Express Mail certification is optional.)*

I hereby certify that this New Application Transmittal and the documents referred to as attached therein are being deposited with the United States Postal Service on this date December 10, 1999, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EL336225281US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Debra G. Conrad

(type or print name of person mailing paper)



Signature of person mailing paper

**WARNING:** Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.

**\*WARNING:** Each paper or fee filed by "Express Mail" must have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).

"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will not be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

(New Application Transmittal [4-1]—page 1 of 11)

jc518 U.S. PTO  
12/10/99

09458906 12-10-99

1. Type of Application

This new application is for a(n)

(check one applicable item below)

- ☒ Original (nonprovisional)  
☐ Design  
☐ Plant

**WARNING:** Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. § 371(c)(4), unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

**WARNING:** Do not use this transmittal for the filing of a provisional application.

**NOTE:** If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

- ☐ Divisional.  
☐ Continuation.  
☐ Continuation-in-part (C-I-P).

2. Benefit of Prior U.S. Application(s) (35 U.S.C. §§ 119(e), 120, or 121)

**NOTE:** A nonprovisional application may claim an invention disclosed in one or more prior filed copending nonprovisional applications or copending international applications designating the United States of America. In order for a nonprovisional application to claim the benefit of a prior filed copending nonprovisional application or copending international application designating the United States of America, each prior application must name as an inventor at least one inventor named in the later filed nonprovisional application and disclose the named inventor's invention claimed in at least one claim of the later filed nonprovisional application in the manner provided by the first paragraph of 35 U.S.C. § 112. Each prior application must also be:

(i) An international application entitled to a filing date in accordance with PCT Article 11 and designating the United States of America; or

(ii) Complete as set forth in § 1.51(b); or

(iii) Entitled to a filing date as set forth in § 1.53(b) or § 1.53(d) and include the basic filing fee set forth in § 1.16; or

(iv) Entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(f) within the time period set forth in § 1.53(f).

37 C.F.R. § 1.78(a)(1).

**NOTE:** If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., or benefit of a prior provisional application is claimed, then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

**WARNING:** If an application claims the benefit of the filing date of an earlier filed application under 35 U.S.C. §§ 120, 121 or 365(c), the 20-year term of that application will be based upon the filing date of the earliest U.S. application that the application makes reference to under 35 U.S.C. §§ 120, 121 or 365(c). (35 U.S.C. § 154(a)(2) does not take into account, for the determination of the patent term, any application on which priority is claimed under 35 U.S.C. §§ 119, 365(a) or 365(b).) For a c-i-p application, applicant should review whether any claim in the patent that will issue is supported by an earlier application and, if not, the applicant should consider canceling the reference to the earlier filed application. The term of a patent is not based on a claim-by-claim approach. See Notice of April 14, 1995, 60 Fed. Reg. 20,195, at 20,205.

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550727 0065450

**WARNING:** When the last day of pendency of a provisional application falls on a Saturday, Sunday, or Federal holiday within the District of Columbia, any nonprovisional application claiming benefit of the provisional application must be filed prior to the Saturday, Sunday, or Federal holiday within the District of Columbia. See 37 C.F.R. § 1.78(a)(3).

- ☐ The new application being transmitted claims the benefit of prior U.S. application(s). Enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

### 3. Papers Enclosed

A. Required for filing date under 37 C.F.R. § 1.53(b) (Regular) or 37 C.F.R. § 1.153 (Design) Application

10 Pages of specification

2 Pages of claims

4 Sheets of drawing

**WARNING:** DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. For comments on proposed then-new 37 C.F.R. § 1.84, see Notice of March 9, 1988 (1990 O.G. 57-62).

**NOTE:** "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page . . ." 37 C.F.R. § 1.84(c)).

(complete the following, if applicable)

- ☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)." 37 C.F.R. § 1.84(b).

☐ formal

☐ informal

### B. Other Papers Enclosed

6 Pages of declaration and power of attorney

1 Pages of abstract

     Other

### 4. Additional papers enclosed

☐ Amendment to claims

- ☐ Cancel in this applications claims \_\_\_\_\_ before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

☐ Add the claims shown on the attached amendment. (Claims added have been numbered consecutively following the highest numbered original claims.)

☐ Preliminary Amendment

☐ Information Disclosure Statement (37 C.F.R. § 1.98)

☐ Form PTO-1449 (PTO/SB/08A and 08B)

☐ Citations

- ☐ Declaration of Biological Deposit
- ☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.
- ☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative
- ☐ Special Comments
- ☐ Other

**5. Declaration or oath (Including power of attorney)**

*NOTE: A newly executed declaration is not required in a continuation or divisional application provided that the prior nonprovisional application contained a declaration as required, the application being filed is by all or fewer than all the inventors named in the prior application, there is no new matter in the application being filed, and a copy of the executed declaration filed in the prior application (showing the signature or an indication thereon that it was signed) is submitted. The copy must be accompanied by a statement requesting deletion of the names of person(s) who are not inventors of the application being filed. If the declaration in the prior application was filed under § 1.47, then a copy of that declaration must be filed accompanied by a copy of the decision granting § 1.47 status or, if a nonsigning person under § 1.47 has subsequently joined in a prior application, then a copy of the subsequently executed declaration must be filed. See 37 C.F.R. §§ 1.63(d)(1)-(3).*

*NOTE: A declaration filed to complete an application must be executed, identify the specification to which it is directed, identify each inventor by full name including family name and at least one given name, without abbreviation together with any other given name or initial, and the residence, post office address and country or citizenship of each inventor, and state whether the inventor is a sole or joint inventor. 37 C.F.R. § 1.63(a)(1)-(4).*

☒ Enclosed

Executed by

(check all applicable boxes)

☒ Inventor(s).

☐ legal representative of inventor(s).  
37 C.F.R. §§ 1.42 or 1.43.

☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ This is the petition required by 37 C.F.R. § 1.47 and the statement required by 37 C.F.R. § 1.47 is also attached. See item 13 below for fee.

☐ Not Enclosed.

*NOTE: Where the filing is a completion in the U.S. of an International Application or where the completion of the U.S. application contains subject matter in addition to the International Application, the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.*

☐ Application is made by a person authorized under 37 C.F.R. § 1.41(c) on behalf of all the above named inventor(s).

(The declaration or oath, along with the surcharge required by 37 C.F.R. § 1.16(e) can be filed subsequently).

☐ Showing that the filing is authorized.  
(not required unless called into question. 37 C.F.R. § 1.41(d))

(New Application Transmittal [4-1]—page 4 of 11)

## 6. Inventorship Statement

**WARNING:** If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

☐ The same.

or

☐ Not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

## 7. Language

**NOTE:** An application including a signed oath or declaration may be filed in a language other than English. An English translation of the non-English language application and the processing fee of \$130.00 required by 37 C.F.R. § 1.17(k) is required to be filed with the application, or within such time as may be set by the Office. 37 C.F.R. § 1.52(d).

☒ English

☐ Non-English

☐ The attached translation includes a statement that the translation is accurate. 37 C.F.R. § 1.52(d).

## 8. Assignment

☒ An assignment of the invention to Nokia Mobile Phones Ltd.

☒ is attached. A separate ☒ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

☐ will follow.

**NOTE:** "If an assignment is submitted with a new application, send two separate letters—one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

**WARNING:** A newly executed "CERTIFICATE UNDER 37 C.F.R. § 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

(New Application Transmittal [4-1]—page 5 of 11)

## 9. Certified Copy

Certified copy(ies) of application(s)

| Country | Appln. No. | Filed            |
|---------|------------|------------------|
| Finland | 982700     | 14 December 1998 |
| Country | Appln. No. | Filed            |
|         |            |                  |
| Country | Appln. No. | Filed            |

from which priority is claimed

☒ Is (are) attached.

☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 C.F.R. § 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. § 120 is itself entitled to priority from a prior foreign application, then complete Item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

## 10. Fee Calculation (37 C.F.R. § 1.16)

A. ☒ Regular application

| CLAIMS AS FILED              |              |            |  |
|------------------------------|--------------|------------|--|
| Number filed                 | Number Extra | Rate       | Basic Fee<br>37 C.F.R. § 1.16(a)<br>\$760.00 |
| Total                        |              |            |  |
| Claims (37 C.F.R. § 1.16(c)) | 9 - 20 = 0   | × \$ 18.00 | 0  |
| Independent                  |              |            |  |
| Claims (37 C.F.R. § 1.16(b)) | 4 - 3 = 1    | × \$ 78.00 | 78.00  |
| Multiple dependent claim(s), |              |            |  |
| If any (37 C.F.R. § 1.16(d)) |              | + \$260.00 |  |

☐ Amendment cancelling extra claims is enclosed.

☐ Amendment deleting multiple-dependencies is enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 C.F.R. § 1.16(d).

Filing Fee Calculation \$ 838.00

B. ☐ Design application  
(\$310.00—37 C.F.R. § 1.16(f))

Filing Fee Calculation \$

C. ☐ Plant application  
(\$480.00—37 C.F.R. § 1.16(g))

Filing fee calculation \$

11. Small Entity Statement(s)

- ☐ Statement(s) that this is a filing by a small entity under 37 C.F.R. § 1.9 and 1.27 is (are) attached.

**WARNING:** "Status as a small entity must be specifically established in each application or patent in which the status is available and desired. Status as a small entity in one application or patent does not affect any other application or patent, including applications or patents which are directly or indirectly dependent upon the application or patent in which the status has been established. The refiling of an application under § 1.53 as a continuation, division, or continuation-in-part (including a continued prosecution application under § 1.53(d)), or the filing of a reissue application requires a new determination as to continued entitlement to small entity status for the continuing or reissue application. A nonprovisional application claiming benefit under 35 U.S.C. § 119(e), 120, 121, or 365(c) of a prior application, or a reissue application may rely on a statement filed in the prior application or in the patent if the nonprovisional application or the reissue application includes a reference to the statement in the prior application or in the patent or includes a copy of the statement in the prior application or in the patent and status as a small entity is still proper and desired. The payment of the small entity basic statutory filing fee will be treated as such a reference for purposes of this section." 37 C.F.R. § 1.28(a)(2).

**WARNING:** "Small entity status must not be established when the person or persons signing the . . . statement can unequivocally make the required self-certification." M.P.E.P., § 509.03, 6th ed., rev. 2, July 1996 (emphasis added).

(complete the following, if applicable)

- ☐ Status as a small entity was claimed in prior application  
\_\_\_\_\_ / \_\_\_\_\_, filed on \_\_\_\_\_, from which benefit  
is being claimed for this application under:

35 U.S.C. § ☐ 119(e),  
☐ 120,  
☐ 121,  
☐ 365(c),

and which status as a small entity is still proper and desired.

- ☐ A copy of the statement in the prior application is included.

Filing Fee Calculation (50% of A, B or C above)

\$ \_\_\_\_\_

**NOTE:** Any excess of the full fee paid will be refunded if small entity status is established and a refund request are filed within 2 months of the date of timely payment of a full fee. The two-month period is not extendable under § 1.136. 37 C.F.R. § 1.28(a).

12. Request for International-Type Search (37 C.F.R. § 1.104(d))

(complete, if applicable)

- ☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

**13. Fee Payment Being Made at This Time**

☐ Not Enclosed

☐ No filing fee is to be paid at this time.

*(This and the surcharge required by 37 C.F.R. § 1.16(e) can be paid subsequently.)*

☒ Enclosed

☒ Filing fee \$ 838.00

☒ Recording assignment  
(\$40.00; 37 C.F.R. § 1.21(h))  
(See attached "COVER SHEET FOR  
ASSIGNMENT ACCOMPANYING NEW  
APPLICATION".) \$ 40.00

☐ Petition fee for filing by other than all the  
inventors or person on behalf of the inventor  
where inventor refused to sign or cannot be  
reached  
(\$130.00; 37 C.F.R. §§ 1.47 and 1.17(i)) \$ \_\_\_\_\_

☐ For processing an application with a  
specification in  
a non-English language  
(\$130.00; 37 C.F.R. §§ 1.52(d) and 1.17(k)) \$ \_\_\_\_\_

☐ Processing and retention fee  
(\$130.00; 37 C.F.R. §§ 1.53(d) and 1.21(l)) \$ \_\_\_\_\_

☐ Fee for international-type search report  
(\$40.00; 37 C.F.R. § 1.21(e)) \$ \_\_\_\_\_

**NOTE:** 37 C.F.R. § 1.21(f) establishes a fee for processing and retaining any application that is abandoned for failing to complete the application pursuant to 37 C.F.R. § 1.53(f) and this, as well as the changes to 37 C.F.R. §§ 1.53 and 1.78(a)(1), indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid, or the processing and retention fee of § 1.21(f) must be paid, within 1 year from notification under § 53(f).

Total fees enclosed \$ 878.00

**14. Method of Payment of Fees**

☒ Check in the amount of \$ 878.00

☐ Charge Account No. \_\_\_\_\_ in the amount of  
\$ \_\_\_\_\_.

A duplicate of this transmittal is attached.

**NOTE:** Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 C.F.R. § 1.22(b).



**15. Authorization to Charge Additional Fees**

**WARNING:** If no fees are to be paid on filing, the following items should not be completed.

**WARNING:** Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.

- ☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 16-1350:

☒ 37 C.F.R. § 1.16(a), (f) or (g) (filing fees)

☒ 37 C.F.R. § 1.16(b), (c) and (d) (presentation of extra claims)

**NOTE:** Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☒ 37 C.F.R. § 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☒ 37 C.F.R. § 1.17(a)(1)-(5) (extension fees pursuant to § 1.136(a)).

☐ 37 C.F.R. § 1.17 (application processing fees)

**NOTE:** "... A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

**NOTE:** Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

**NOTE:** 37 C.F.R. § 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . the issue fee. . . ." From the wording of 37 C.F.R. § 1.28(b), (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

16. Instructions as to Overpayment

NOTE: "... Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

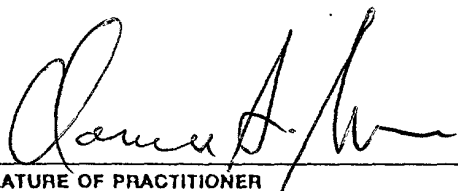
- ☒ Credit Account No. 16-1350  
☐ Refund

SEND ALL CORRESPONDENCE TO:

Reg. No. 24,622

Tel. No. (203) 259-1800

Customer No.

  
SIGNATURE OF PRACTITIONER  
Clarence A. Green  
(type or print name of attorney)  
PERMAN & GREEN, LLP  
P.O. Address  
425 Post Road, Fairfield, Connecticut 06430

☐ **Incorporation by reference of added pages**

*(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)*

- ☐ Plus Added Pages for New Application Transmittal Where Benefit of Prior U.S. Application(s) Claimed

Number of pages added \_\_\_\_\_

- ☐ Plus Added Pages for Papers Referred to in Item 4 Above

Number of pages added \_\_\_\_\_

- ☐ Plus added pages deleting names of inventor(s) named in prior application(s) who is/are no longer inventor(s) of the subject matter claimed in this application.

Number of pages added \_\_\_\_\_

- ☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added \_\_\_\_\_

☒ **Statement Where No Further Pages Added**

*(if no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item)*

- ☒ This transmittal ends with this page.

## **A method to determine channel information in a cellular system, and a mobile station**

The object of the invention is a method for determining channel information in a cellular system, where a TDMA (Time Division Multiple Access) transmission protocol is used on the traffic channel allocated to the user traffic connection during the user traffic connection between a mobile station and a base station of the current cell, and a mobile station realising the method. The invention is advantageously applied in a system which utilises a number of time slots of the TDMA frame to transmit information, such as in a system utilising the so called HSCSD protocol (High Speed Circuit Switched Data). Most advantageously the invention can be used in WLL (Wireless Local Loop) terminals.

- 5
- 10 Information about a base station in a neighbour cell is transmitted from the base station to the mobile station, i.a. for synchronising to the neighbour cell base station and for performing level measurements. In order to understand the invention a prior art neighbour cell monitoring in a cellular network is described in more detail below using a digital GSM system (Global System for Mobile communications) as an example.
- 15

In the GSM system separate frequency bands are allocated to transmission and reception, and on each frequency the data is transmitted as bursts in the slots of a TDMA frame. The TDMA frames contains eight time slots, of which one or more are allocated to the connection between the mobile station and the base station.

- 20 A mobile station operating in a cellular network needs information about the base stations of the active cell and of the base stations in the other cells around the mobile station so that it is able to perform a flexible handover when required. Figure 1 shows a cell (Serving cell), which serves a mobile station of the system, and the six other cells (Cell 1 to Cell 6) which are located around it. The mobile station measures the signal levels (RXLEV) which it receives from the base stations of these cells, and reports the measurement data to the serving base station. In the GSM system each base station has a certain transmission frequency, a so called broadcasting frequency, at which the base station continuously transmits with a constant power. The mobile station measures the power received from the base stations at the broadcasting frequency of respective base station. In the following said signal level measurement (RXLEV) of the neighbour base stations is called "neighbour cell base station level measurement".
- 25
- 30

The mobile station must also receive the Base Station Identity Code (BSIC) of each base station so that the mobile station knows which base station's signal level it measures at each frequency. Each base station transmits regularly the identity code. One time slot of the TDMA frames transmitted at the broadcasting frequency, the time slot "0", is allocated to channels which simultaneously transmit information to a plurality of mobile stations, i.a. for synchronising to the base station. Such channels in the GSM system are i.a. the following: the Frequency Correction CHannel (FCCH), the Synchronisation CHannel (SCH), the Broadcast Control CHannel (BCCH), and the Common Control CHannel (CCCH). Fifty-one TDMA frames form a so called 51-multiframe (Multi Frame). Regarding the above mentioned channels it is specified in which TDMA frame of the multiframe they are located. A mobile station looks for and decodes the channels located in said TDMA frame of the broadcasting frequency among the neighbour base station transmissions. Said base station identity code BSIC is transmitted on the synchronisation channel SCH.

The above mentioned function of a mobile station for receiving information transmitted by a neighbour base station is in the following called "reception of neighbour base station information". The level measurement (RXLEV) of a neighbour cell base station and reception of neighbour cell base station information (BSIC) is for short called "neighbour cell monitoring".

Figure 2 shows the TDMA frame structure of the downlink in the GSM system and the moments when the neighbour cell monitoring is performed. The transmission and reception is presented in the figure as mobile station functions, whereby TX means data transmission on the uplink and RX means data transmission on the downlink. The TDMA frames 21, 23 and 24 contain eight time slots, of which the time slot "0" is used for data reception RX, and the data transmission TX to the base station occurs during the time slot "3". The time slot "0" in the uplink TDMA frame is located at the time slot "3" in the downlink TDMA frame, because there is a timing difference of three time slots between the downlink and uplink TDMA frames. Thus there are two unused time slots between the reception RX and transmission TX, and during these two time slots the frequency synthesiser switches from the reception frequency to the transmission frequency. Then four unused time slots are left at the end of normal TDMA frames, during which the neighbour base station level measurements are made, period 26.

A mobile station receives neighbour base station information during empty frames (so called Idle frames), every 26th TDMA frame of the frames transmitted by a base

station is such an empty frame. No speech/data is transmitted in neither direction in the cell in question during an idle frame. The idle frames and the above mentioned 51-multiframes are arranged in sequences with different lengths, 26 and 51 TDMA frames, so that the SCH channel burst can be received in at least every eleventh idle frame, as is shown in the example of figure 2 during the shown idle frame 22, period 25. Either before or after an idle frame the transmitted frames also contain time slots which are not used by the user traffic connection, which unused time slots together with the idle frame in this case form a period of 12 time slots, during which period the neighbour base station information can be received. The neighbour base station information can also be received during the time slots of such normal TDMA frames in which the mobile station itself does not receive or transmit information of the user traffic connection.

In known solutions the time required for neighbour cell monitoring may become a problem. Each surrounding base station broadcasts on a different frequency, and therefore the frequency synthesiser of the mobile station must be able to switch sufficiently rapidly to the examined frequency so that the monitoring can be performed. When the monitoring has been performed the frequency synthesiser must rapidly return to a frequency where it can either receive or transmit information on the user traffic connection.

Problems may occur in the new broadband GSM2+, HSCSD (High Speed Circuit Switched Data) and GPRS (General Packet Radio Service) services, because in them the connection's traffic channel utilises more time slots of the TDMA frame than in the previous basic systems. Figure 3 presents as an example a frame structure which is used in a mobile station according to the HSCSD class 12 MS. In said class it is possible to use a total of five time slots out of the eight in a frame, so that the majority of the time slots are allocated to reception. In the example of figure 3, of the eight time slots belonging to the frame three time slots are used for reception RX and two time slots for transmission TX. In figure 3 the TDMA frame RX of the downlink and the TDMA frame TX of the uplink are presented as separate frames.

The HSCSD classes include full duplex systems in which a mobile station can simultaneously both transmit and receive information. However, in the case of figure 3, HSCSD class 12 MS, the mobile station is in a half duplex operating state. Of all half duplex HSCSD classes this class presents the highest requirements on the frequency synthesiser. In the case of figure 3 the neighbour base station level measurement 32 made within the TDMA frame at the interface between the transmit time

slots 3 and 4 requires a frequency hop to the examined frequency 31 before the measurement. After the measurement 32 a new hop is made to the reception frequency 33 of the traffic channel.

In addition to the neighbour base station level measurement made within the TDMA frame used by the traffic channels there are also made level measurements during the idle frame and the idle time slots adjacent to it. The corresponding period is it the following called the "Idle period". In the example case of figure 4 the length of said period 41 is 10 time slots. Figure 4 shows the TDMA frames transmitted on the broadcasting frequency of a neighbour base station, and the time slots 42, 43 and 44 allocated to the FCCH, SCH and CCCH channels in these TDMA frames. As is observed in figure 4 the time slot S of the synchronisation channel is in this case located at the very beginning of the available reception period, whereby the frequency synthesiser has not yet had time to settle on the broadcasting frequency of the neighbour base station. When the settling time with a length of about one slot of the frequency synthesiser is taken into account, then there are actually only eight time slots during which the synchronisation channel can be received. In some HSCSD classes the time slots allocated to the traffic channel can not be used to receive neighbour base station information, because several extra time slots are allocated to the mobile station. In this case the timing of the received neighbour base station channels can become critical regarding the available time. The time slot of the received channel occurs either at the very beginning of the Idle period or at its end, whereby the frequency synthesiser has not enough time to perform the required frequency hops.

The figure 4 shows how a mobile station receives neighbour cell transmissions during the Idle period. In this example the synchronisation channel 43 and the control channel 44 occurs within this Idle period window there. The shown situation is most unfavourable, because only the reception of the control channel 44 is successful as there is sufficiently time on both sides of it for the frequency synthesiser to make the frequency hop. Thus the search for all channels of the neighbour cell base stations and the decoding of the information contained in them requires a lot of time in the mobile station. In the cases shown in figures 3 and 4 a successful monitoring in a mobile station using the HSCSD protocol requires either the use of a very fast frequency synthesiser or one extra synthesiser only for the neighbour cell monitoring. Corresponding situations requiring a rapid frequency hop occur also in other HSCSD classes.

In the above described situations the mobile station does not have time to perform a perfect neighbour cell monitoring. In order to solve this problem the mobile station must be equipped with either a faster frequency synthesiser or with a second frequency synthesiser intended for monitoring purposes. However, the manufacturing of a very fast frequency synthesiser requires special components, and therefore the use of such a frequency synthesiser in conventional mobile stations would cause substantial extra costs. The addition of a second frequency synthesiser would also cause substantial extra costs. Secondly, the use of a fast frequency synthesiser or of two frequency synthesisers would increase the power required by the mobile station, which shortens the operational time of a mobile station equipped with a battery.

The object of the invention is to present a solution which can avoid the above described disadvantages related to the prior art. With the aid of the invention the required neighbour cell monitoring can be performed in a mobile station using a multi-slot protocol, so that the mobile station can be realised using a conventional frequency synthesiser.

The invention is based on the perception that in a normal operating situation the information about a stationary mobile station, about the cell serving it, and about the neighbour base stations, scarcely change from one moment to the next. In the following such a still standing mobile station is called a stationary mobile station. Such mobile stations are i.a. a WLL terminal and a so called radio terminal, which is used i.a. in remote control and automation applications. Changes in the connection's identity codes can be caused for instance by the introduction of a new base station, or when a large obstacle in the communication path appears or disappears during a user traffic connection. Thus the received neighbour cell base station identity codes (BSIC) will remain unchanged with a high probability during a user traffic connection. According to the present invention this information is stored in the mobile station, advantageously a stationary mobile station, before the user traffic connection is established and for the whole user traffic connection period, and a new complete neighbour cell monitoring step is performed only when this user traffic connection has been terminated. The level measurements (RXLEV) of the base stations in the neighbouring cells can be made during empty frames, or alternatively also they can be made only outside the user traffic connection.

An advantage of the invention is that a conventional frequency synthesiser can be used when only the neighbour base station signal levels (RXLEV) are monitored during a user traffic connection in an environment using a multi-timeslot protocol.



This is advantageous both regarding the power consumption of the mobile station and its manufacturing costs.

An advantage of the invention is also that the structure of the mobile station will become simpler and its operation will be reliable, because the circuits don't have to  
 5 operate at the extreme limits of the specifications regarding the operating speed and because there is no need for multiple frequency synthesiser circuits.

A further advantage of the invention is that also a movable mobile station can, when it is stationary, increase the efficiency of the data communication with the base station, in other words it can switch over to use more time slots and thus enable an effective use of for instance multimedia services, either in the mobile station itself or  
 10 with the aid of other devices connected to it.

A method according to the invention is characterised in that the reception of the neighbour cell base station identity code (BSIC) is prevented during a user traffic connection. A method according to the invention is also characterised in that the  
 15 level measurement (RXLEV) of the neighbour cell base stations is prevented during a TDMA frame allocated to the traffic channels.

A mobile station according to the invention is characterised in that it comprises means to prevent the reception of neighbour cell base station data (BSIC) during a user traffic connection. A mobile station according to the invention is also characterised in that it comprises means to prevent the neighbour cell base station level  
 20 measurement (RXLEV) during a TDMA frame allocated to the traffic channels.

Preferred embodiments of the invention are presented in the dependent claims.

The invention is described in detail below. In the description reference is made to the enclosed drawings, in which

25 Figure 1 shows the basic structure of a cellular network,

Figure 2 shows the general frame structure of the GSM system,

Figure 3 shows an example of the monitoring in a normal frame structure of the HSCSD class 12 MS.

30 Figure 4 shows an example of the monitoring during the Idle period of the HSCSD class 12 MS,

Figure 5 shows the monitoring according to the invention in an environment according to the HSCSD protocol,

Figure 6 shows in a flow diagram the monitoring in a mobile station according to the invention,

- 5 Figure 7 shows in a block diagram the essential parts regarding the invention in a stationary mobile station according to the invention.

The figures 1 to 4 were described above in connection with the description of prior art.

- 10 Figure 5 shows a usage according to the invention for monitoring neighbour cells in a stationary mobile station using a half-duplex HSCSD protocol. Level measurements 53, 55, 57 of the neighbour base station's transmission are made only during the Idle period shown in the figure, and not during the TDMA frames used for the actual user traffic transmission. This Idle period contains one whole normal empty frame and any preceding or succeeding unused time slots. In the example of figure 5
- 15 the Idle period begins when the stationary mobile station has finished to transmit TX information in the transmission time slot 3. The Idle period is ends when the stationary mobile station begins to receive the base station's transmission RX in the time slot 0 of the reception frame. In the example a total of 9 time slots is available for the level measurements of the neighbour cell transmissions. During the available
- 20 Idle period the frequency synthesiser of the stationary mobile station has time to make three frequency hops to the frequencies used by the neighbour cell base stations and to find the FCCH and SCH channels. With the practice according to the invention the frequency synthesiser of the stationary mobile station can make all required frequency hops within a reasonable time in order to perform the level measurements of the transmissions from the base stations of all six surrounding cells.
- 25 Thus a stationary mobile station according to the invention can use a conventional frequency synthesiser.

- 30 The practice according to the invention can be applied also in a movable mobile station when it is known or detected to be stationary. The mobile station can be detected to be stationary by examining the transmission advance which it requires. If the transmission advance does not change, then the mobile station is stationary. When the monitoring of the unchanged neighbour cell information is left outside the TDMA frames used for data transmission it is possible to allocate to the mobile station more time slots in the TDMA frame, for instance when transmitting data, im-

ages or a video picture.

In GPRS systems there are available more versatile transmission protocols than in the GSM systems. Within the framework of these the neighbour cell monitoring can be made in the same way as in a mobile station according to the invention. In the GPRS systems a mobile station can further request, when required, the base station to allocate to it a sufficient number of empty frames, so that it is able to perform the required monitoring operations. Thus in a method according to the invention there is no need for neighbour cell monitoring in the GPRS system during the actual TDMA frames, but the neighbour cell monitoring can be concentrated to those periods when the GPRS mobile station is in the Idle state.

Figure 6 shows a simplified flow diagram of the operation in a mobile station according to the invention when it performs neighbour cell monitoring. The flow diagram shows only the most essential method steps. Initially the mobile station is in the standby state in order to establish a connection, step 60. Then the mobile station performs normal neighbour cell monitoring, step 61, as it waits for a connection establishment request, step 62. When the connection establishment request has arrived there is taken a decision whether a reduced neighbour cell monitoring shall be used, step 63. If it is decided to continue the use of normal neighbour cell monitoring, the operation continues at step 68. If it is decided to switch to the reduced neighbour cell monitoring according to the invention, then the last complete neighbour cell monitoring results are stored in the memory of the mobile station, step 64. When the data has been stored the connection is established in a normal manner, step 65. During the established user traffic connection, in step 66, out of the neighbour cell transmissions only the level information in the transmission from each base station is received and examined during the empty TDMA frames. The identity codes (BSIC) transmitted by the base stations are not received nor decoded during a user traffic connection. In step 67 the user traffic connection is disconnected. Then the mobile station switches to the normal neighbour cell monitoring, step 68. Finally there is step 69, where the mobile station is again ready to establish a new user traffic connection.

Figure 7 shows in a block diagram those parts of a stationary mobile station according to the invention operating in a GSM network which are essential regarding the invention. The changes caused by the invention are mainly included in the control unit 71, which controls the frequency synthesiser 72, which changes the transmission and reception frequencies of the RF receiver 73. In a situation according to the

invention where neighbour base station level measurement is performed during the connection the control unit 71 set the reception frequency, at a moment which it has determined, to the frequency of the base station of the desired neighbour cell. The frequency of the base station in the neighbour cell is typically obtained from a so called neighbour cell list, which a mobile station according to the invention has received from the BCCH channel and stored in its memory before the user traffic connection is established.

In a transmission situation the encoded sample stream obtained from the information source 80 is further directed to a two-stage channel encoder 81, which comprises a block and convolution encoder. The block encoder adds a bit pattern at the end of each information frame, and the convolution encoder increases the redundancy of the frame formed above by increasing the length of the frame. Both operations are made in order to make the error detection and correction easier at the reception. The length of the frame formed in the channel encoding is 456 bits.

The next step is a two-stage interleaving 82. First the bit sequence of the frame formed above is processed with a certain algorithm, and the obtained new frame is divided into eight parts of equal size. These parts are further placed into eight consecutive TDMA frames. The most important object of the interleaving is to spread the transmission errors, which generally occur in a certain burst, evenly in the eight frames. Thus errors which occur in sequential bits during the transmission of the TDMA frame causes single bit errors in the frames formed in the channel encoding, which are easier to correct.

The transmission is also encrypted so that the transmitted information should not be available to unauthorised persons. The encrypted data is converted into an information burst in the block 83 by adding a training sequence, end bits and time. Then there is performed a GMSK (Gaussian Minimum Shift Keying) modulation 84, where the bits are converted from the digital form into an analogue signal so that different phases in the transmission signal correspond to the bits. Finally the modulated burst is transmitted at a radio frequency by the RF transmitter 85 via the Rx/Tx switch 86, which now is in the transmission position, and then to the antenna 87. The relevant frequency used by the transmitter is obtained from the frequency synthesiser 72.

The receiving sections of the mobile station operate in an inverted manner regarding what was presented above. This is briefly described below.

In a normal situation information is received from the antenna 87 when the Rx/Tx switch 86 is in the reception position and directs the signal to the RF receiver 73 having a reception frequency generated by the frequency synthesiser 72. Then the signal is supplied to the analogue-to-digital converter 74 which converts the analogue signal into a digital one. Then there is performed a detection demodulation 75, and in connection with it the obtained level measurement information (RXLEV) of the neighbour cell information is supplied to the control unit 71. After the detection demodulation there is deinterleaving 76 and channel decoding 77, whereby an aim is to correct any bit errors. After the channel decoder the BSIC information obtained from the neighbour base station measurements is supplied to the control unit 71. After the channel decoder 77 there is yet decoding of the source information in the block 78 before it can be utilised. On the basis of the neighbour cell monitoring information which the control unit 71 has received it performs the required operations in order to maintain the user traffic connection and to control the neighbour cell monitoring.

The sections 72 to 77 and 81 to 85 in the figure are controlled by the control unit 71, where the changes according to the invention are made. The changes required by the invention are mainly software changes in the control unit 71 which enable the operation according to the invention. When the practice according to the invention is applied, only the level information (RXLEV) is received from the transmission transmitted by the neighbour cell base station, and after detection demodulation 75 this level information is supplied to the control unit 71. The neighbour cell base station identity code (BSIC) is not received. Thus the method according to the invention can use a normal frequency synthesiser in the mobile station, or the procurement of one separate frequency synthesiser is avoided.

Some applications of the invention and ways to realise them were presented above. Of course the invention is not limited to the examples presented above, but the principle according to the invention can be varied within the scope of the claims, for instance regarding the embodiment details and fields of application. Particularly it must be noted that even though the examples presented above relate to the application of the invention in a stationary mobile station in the GSM system, the invention can be used also in other digital TDMA cellular systems. Further the invention can be applied also in mobile stations at such moments when the mobile station is found to be stationary, or moving very slowly.

## Claims

1. A method for determining channel information in a cellular system, where a TDMA transmission protocol is used on the traffic channel allocated to the connection for transmitting user information during a connection between a mobile station and a base station of the current cell, in which method the base station identity codes (BSIC) (61) of the neighbour cells are received and stored, **characterised** in that said reception of the base station identity codes of the neighbour cells is prevented during the user traffic connection (66).
2. A method according to claim 1, **characterised** in that
  - neighbour cell base station identity codes (BSIC) are received and stored in the memory of the mobile station before the user traffic connection is established; and
  - when the user traffic connection has been disconnected the mobile station receives identity codes of the neighbour cell base stations and updates in the memory any changes, which have occurred during the previous user traffic connection.
3. A method for A method for determining channel information in a cellular system, where a TDMA transmission protocol is used on the traffic channel allocated to the connection for transmitting user information during the connection between a mobile station a base station of the current cell, in which method the levels of the base stations of the neighbour cells are measured (RXLEV) (61) **characterised** in that said level measurement of the base stations of the neighbour cells is prevented during the period of the TDMA frame allocated to traffic channels (66).
4. A method according to claim 3, **characterised** in that the level measurement of the base stations of the neighbour cells is made during a user traffic connection when an empty frame is allocated to the mobile station.
5. A method according to claim 3, **characterised** in that said level measurement of the base stations of the neighbour cells is prevented during the user traffic connection.
6. A mobile station which belongs to a cellular system and which comprises means (71 to 87) for transmitting/receiving user information on a traffic channel using a TDMA protocol between the base station of the current cell and the mobile station, and means (71 to 77) for receiving and storing the base station identity codes (BSIC) of the neighbour cells. **characterised** in that it comprises means (71 to 77) for preventing said reception of the base station identity codes of the neigh-

bour cells during the user traffic connection.

7. A mobile station according to claim 6, **characterised** in that it is a stationary mobile station.

5 8. A mobile station which belongs to a cellular system and which comprises means (71 to 87) for transmitting/receiving user information on a traffic channel using a TDMA protocol between the base station of the current cell and the mobile station, and means (71 to 77) for performing level measurement (RXLEV) of the base stations of the neighbour cells, **characterised** in that it comprises means (71 to 75) for preventing said measurement of the base stations of the neighbour cells  
10 during a TDMA frame allocated to traffic channels.

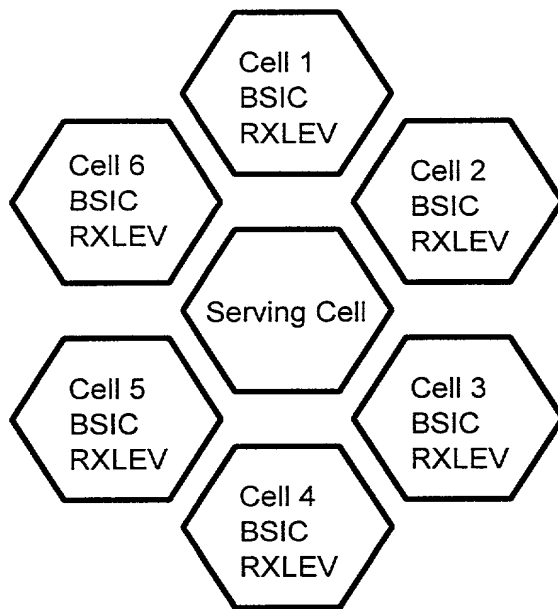
9. A mobile station according to claim 8, **characterised** in that it is a stationary mobile station.

## Abstract

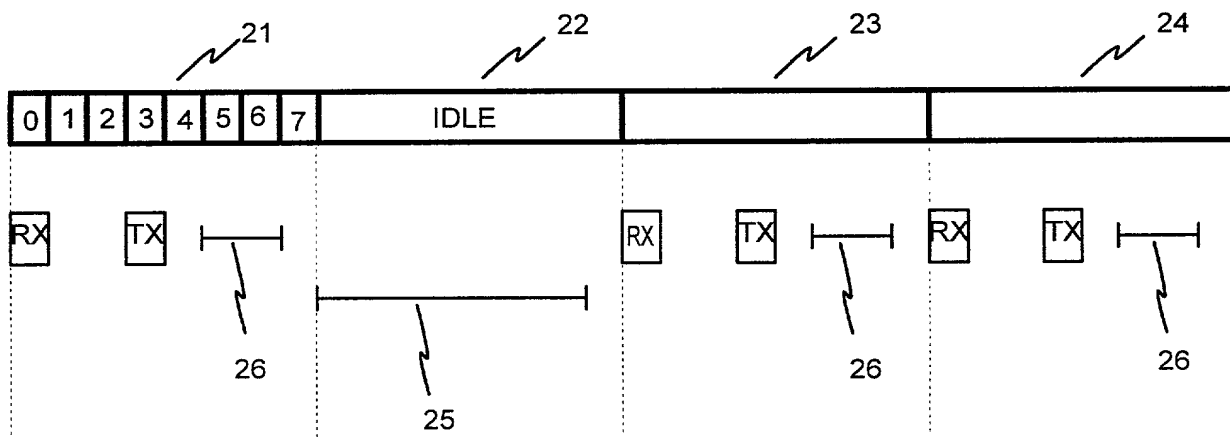
The object of the invention is a method for determining channel information in a cellular system, where user information is transmitted in information frames transmitted by the base station of the current cell, and in which method neighbour cell base station information is received (25, 26, 32, 43, 44, 53, 55, 57) for the synchronising to the neighbour cell base station. In a method according to the invention the Base Station Identity Code (BSIC) information is received and examined (53, 55, 57) only outside the TDMA frames used to transmit the information. Said code information is stored in the memory of the mobile station for the period of the TDMA frames used to transmit information. The method is also advantageously used in a Wireless Local Loop terminal utilising HSCSD protocol for determining and storing channel information. When the method according to the invention is used a WLL terminal needs no extra frequency synthesiser for performing the neighbour cell monitoring.

15 Figure 5

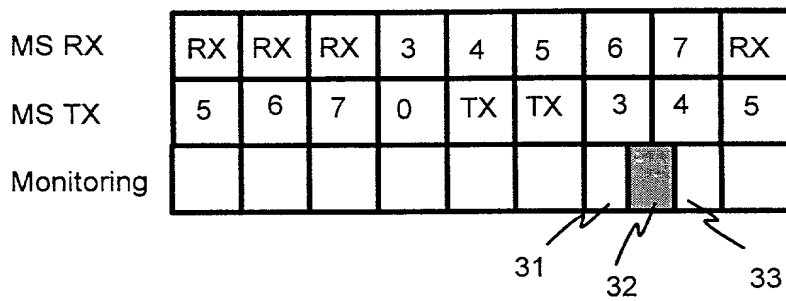




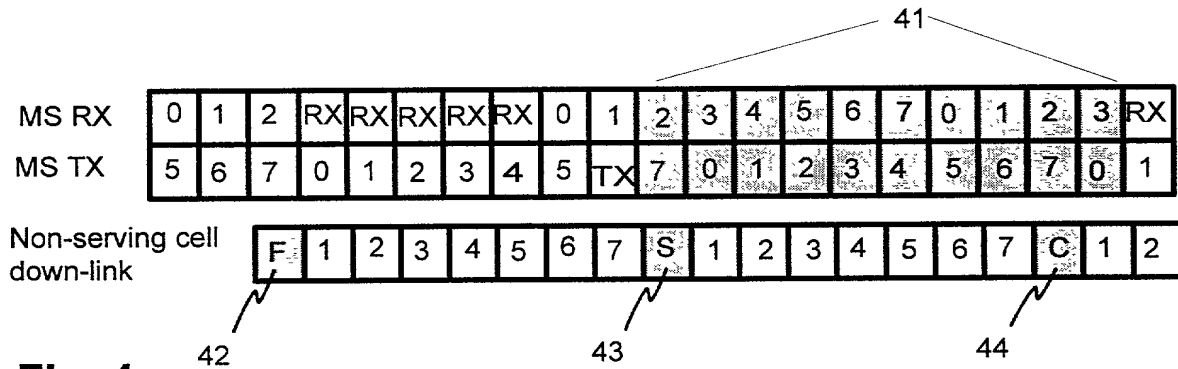
**Fig. 1**



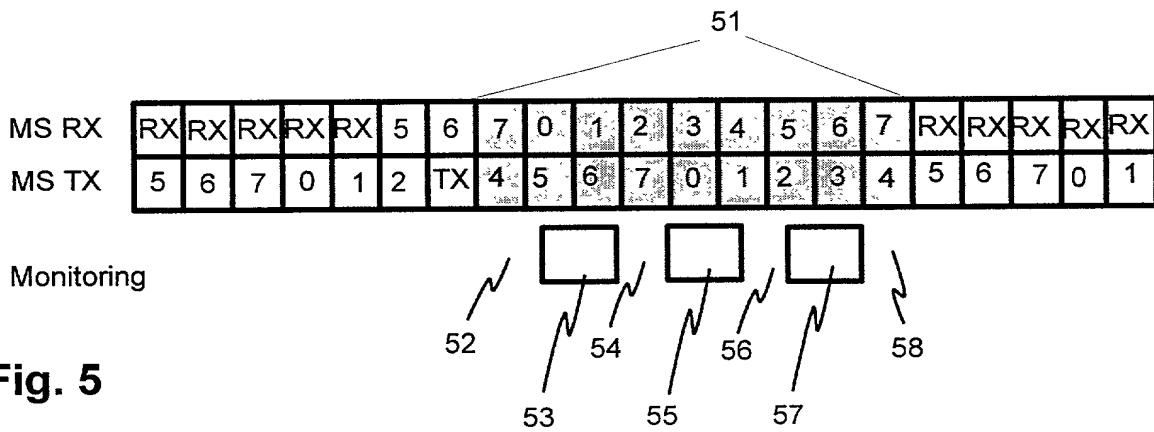
**Fig. 2**



**Fig. 3**



**Fig. 4**



**Fig. 5**

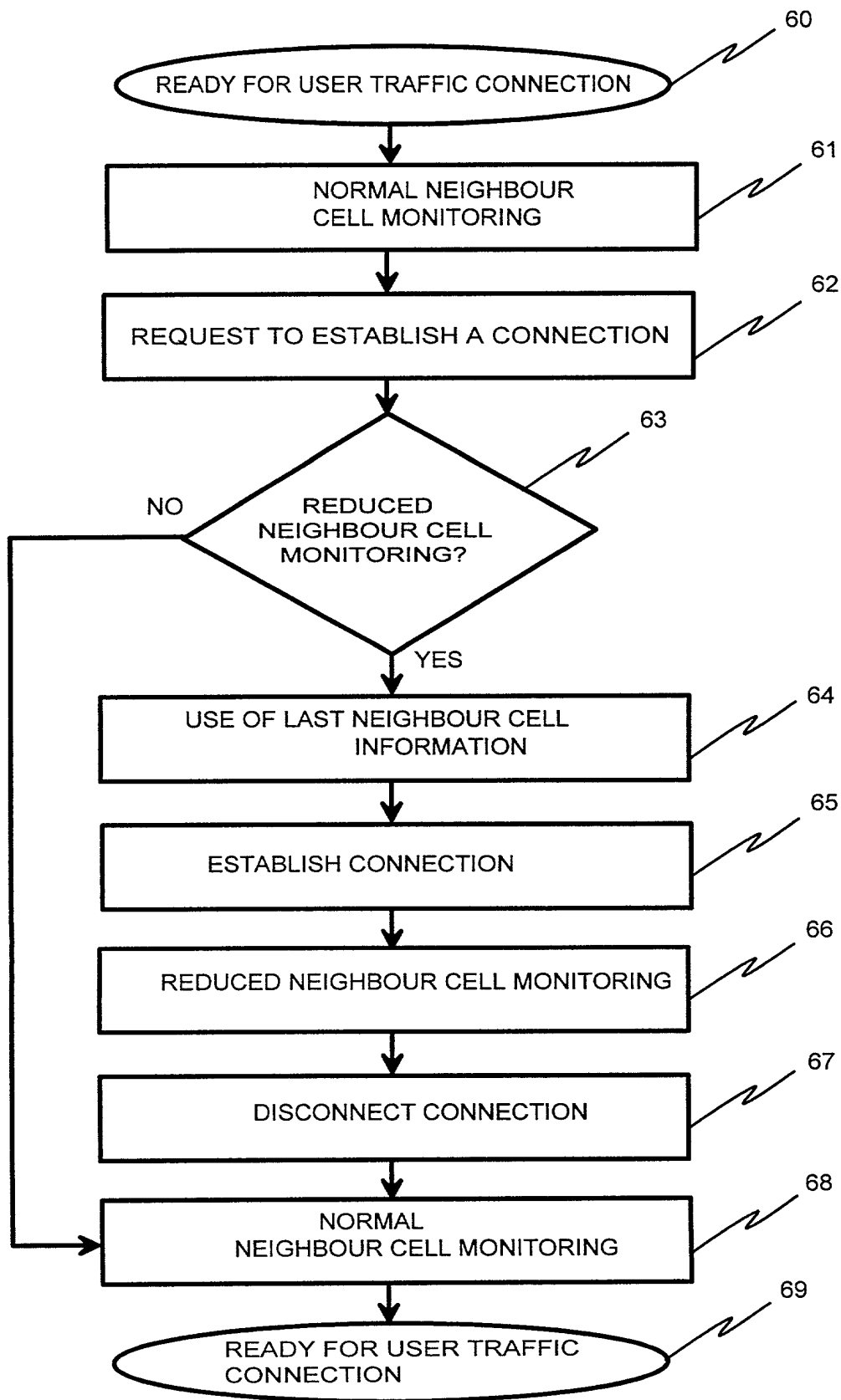
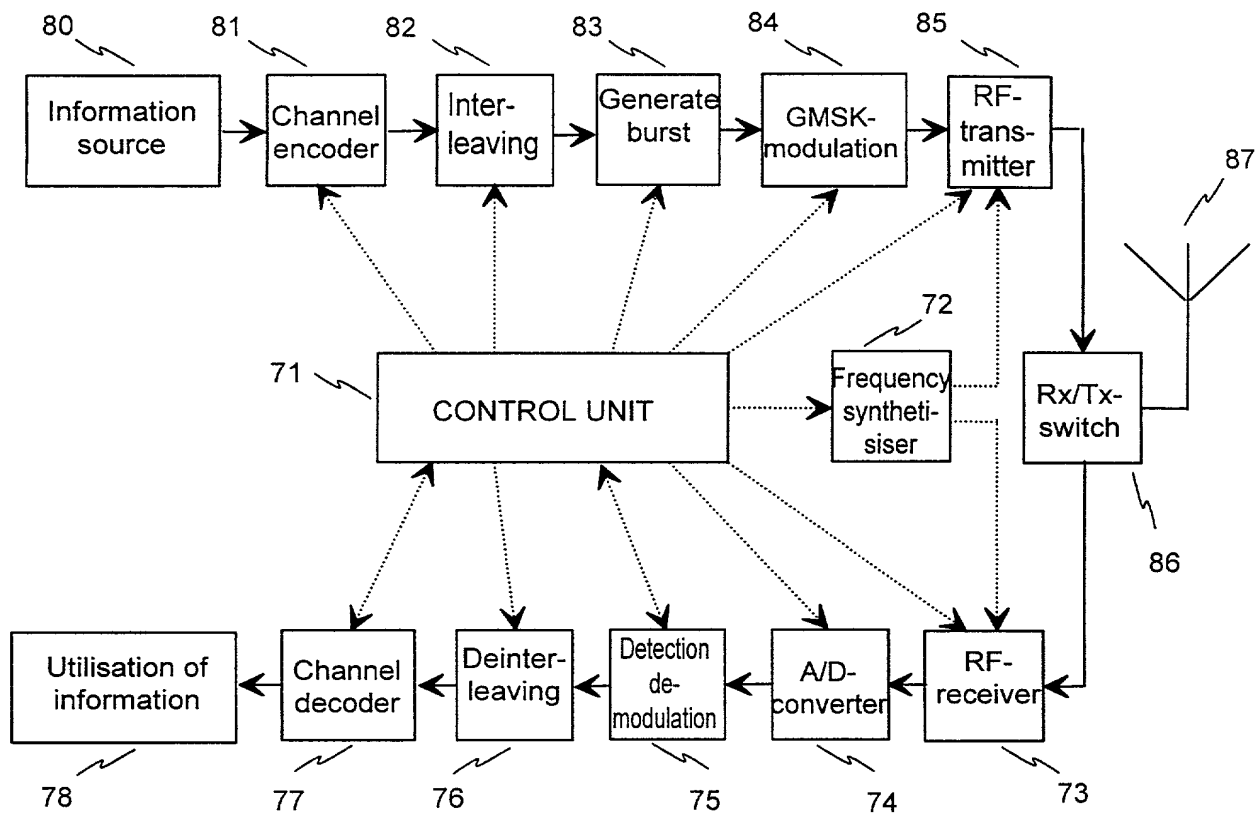


Fig. 6



**Fig. 7**

**COMBINED DECLARATION AND POWER OF ATTORNEY  
(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,  
CONTINUATION OR C-1-P)**

As a below named inventor, I hereby declare that:

**TYPE OF DECLARATION**

This declaration is of the following type:

(check one applicable item below)

- ☒ original.  
☐ design.  
☐ supplemental.

**NOTE** If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item, check appropriate one of last three items

☐ national stage of PCT.

**NOTE** If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P

- ☐ divisional.  
☐ continuation.  
☐ continuation-in-part (C-I-P).

**INVENTORSHIP IDENTIFICATION**

**WARNING** If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

**TITLE OF INVENTION**

**A method to determine channel information in a cellular system, and a mobile station**

## SPECIFICATION IDENTIFICATION

the specification of which:

(complete (a), (b) or (c))

(a) X is attached hereto.

(b) \_\_\_ was filed on \_\_\_\_\_ as Serial No. \_\_\_\_\_

or \_\_\_ Express Mail No., as Serial No. not yet known  
and was amended on \_\_\_\_\_ (if applicable).

*NOTE.* Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.

(c) \_\_\_ was described and claimed in PCT International Application No. \_\_\_\_\_  
filed on \_\_\_\_\_ and as amended under PCT Article 19 on \_\_\_\_\_ (if  
any).

## ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56,

(also check the following items, if desired)

X and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and

\_\_\_ in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 CFR 1.98.

**PRIORITY CLAIM (35 U.S.C. § 119(a)-(d))**

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

*(complete (d) or (e))*

(d) ☐ no such applications have been filed.

(e) ☒ such applications have been filed as follows.

**NOTE.** Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION  
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119(a)-(d)**

| COUNTRY(OR<br>INDICATE IF PCT) | APPLICATION NUMBER | DATE OF FILING<br>(day, month, year) | PRIORITY CLAIMED<br>UNDER 37 USC 119    |                             |
|--------------------------------|--------------------|--------------------------------------|---|-----------------------------|
| Finland                        | 982700             | 14 December 1998                     | <input checked="" type="checkbox"/> YES | <input type="checkbox"/> NO |
|                                |                    |                                      | <input type="checkbox"/> YES            | <input type="checkbox"/> NO |
|                                |                    |                                      | <input type="checkbox"/> YES            | <input type="checkbox"/> NO |
|                                |                    |                                      | <input type="checkbox"/> YES            | <input type="checkbox"/> NO |
|                                |                    |                                      | <input type="checkbox"/> YES            | <input type="checkbox"/> NO |

**CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)  
(34 U.S.C. § 119(e))**

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER

FILING DATE

/\_\_\_\_\_  
/\_\_\_\_\_  
/\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CLAIM FOR BENEFIT OF EARLIER US/PCT APPLICATION(S)  
UNDER 35 U.S.C. 120

\_\_\_ The claim for the benefit of any such applications are set forth in the attached  
ADDED PAGES TO COMBINED DECLARATION AND POWER OF  
ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-  
PART (C-I-P) APPLICATION.

ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS  
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

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NOTE. If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

*(list name and registration number)*

|                    |          |
|--------------------|----------|
| Clarence A. Green  | (24,622) |
| Harry F. Smith     | (32,493) |
| Mark F. Harrington | (31,686) |

*(check the following item, if applicable)*

\_\_\_ Attached, as part of this declaration and power of attorney, is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO

Clarence A. Green  
Perman & Green  
425 Post Road  
Fairfield, Ct 06430

DIRECT TELEPHONE CALLS TO:  
*(Name and telephone number)*

Clarence A. Green  
203-259-1800





(check proper box(es) for any of the following added page(s)  
that form a part of this declaration)

☐ **Signature** for fifth and subsequent joint inventors. *Number of pages added* 1 .

\* \* \*

☐ **Signature** by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* \_\_\_\_\_.

\* \* \*

☐ **Signature** for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* \_\_\_\_\_.

\* \* \*

☐ Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 CFR 1.47)

\* \* \*

☐ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

\_\_\_\_ Number of pages added \_\_\_\_\_

\* \* \*

☐ Authorization of attorney(s) to accept and follow instructions from representative.

\* \* \*

(if no further pages form a part of this Declaration,  
then end this Declaration with this page and check the following item)

☒ This declaration ends with this page.